

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

Jeffery N. Gleason

Serial No.: 10/690,319

Filed: October 20, 2003

For: INTERMEDIATE
SEMICONDUCTOR DEVICE
STRUCTURE (as amended)

Confirmation No.: 1135

Examiner: H. Trinh

Group Art Unit: 2814

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(2001-1004.01/US)

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BRIEF IN REPLY TO EXAMINER'S ANSWER

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
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Attn: Board of Patent Appeals and Interferences

Sirs:

Appellant hereby submits this Brief in Reply (“Reply”) to the Examiner’s Answer (“Examiner’s Answer”), the Examiner’s Answer having been mailed on February 28, 2008. This Reply is submitted on or before two months from the mailing of the Examiner’s Answer.

APPELLANT'S REPLY TO THE EXAMINER'S ANSWER

Claims 1-8 are pending in the application and have been rejected. Claims 1-8 are the subject of the pending appeal.

Claims 1 and 3-8 stand rejected under 35 U.S.C. § 102(b) as allegedly being unpatentable over United States Patent No. 3,699,395 to Boleky ("Boleky").

Claim 2 stands rejected under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a) as allegedly being unpatentable over Boleky.

The arguments presented in Appellant's Appeal Brief filed on January 15, 2008, are incorporated herein by reference in their entirety. In this Reply, Appellant presents arguments in response to the issues raised in the Examiner's Answer.

I. Improper New Ground of Rejection

Appellant notes that the Examiner's Answer improperly includes a new ground for rejection. M.P.E.P. § 1207.03(II) states that "if an appellant has clearly set forth an argument in a previous reply during prosecution of the application and the examiner has failed to address that argument, the examiner would not be permitted to add a new ground of rejection to respond to that argument but would be permitted to reopen prosecution." During prosecution and in response to Appellant's argument that strip 18 is made of a semiconductor material, not a metal, the Examiner only set forth the argument that silicon is known in the art to be a metal. However, for the first time in the Examiner's Answer, the Examiner relies on language in col. 5, lines 45-

46 of Boleky that discloses “metal strip 18.” As such, Appellant never had an opportunity to respond to that particular argument prior to the appeal because the Examiner failed to properly address Appellant’s previous arguments.

Even though Appellant considers the Examiner’s actions to be improper, Appellant addresses the new ground for rejection as outlined below in order to be responsive.

II. Rejection under 35 U.S.C. § 102(b) over Boleky

Claims 1 and 3-8

A. STANDARD OF PATENTABILITY UNDER 35 U.S.C. § 102(b)

A claim is anticipated under 35 U.S.C. § 102(b) only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

In view of this standard and the arguments set forth below, Appellant respectfully submits that the claims are not anticipated under 35 U.S.C. § 102(b) by Boleky.

B. NOT EVERY ELEMENT AS SET FORTH IN THE CLAIMS IS FOUND EXPRESSLY OR INHERENTLY DESCRIBED IN BOLEKY

Claims 1 and 3-8 stand rejected under 35 U.S.C. § 102(b) as being unpatentable over Boleky. Appellants respectfully submit that the 102(b) rejection of claims 1 and 3-8 should be

reversed because Boleky fails to describe, either expressly or inherently, each and every element as set forth in the claims.

1. Boleky Does Not Expressly or Inherently Describe Each And Every Element of Claim 1

Boleky does not anticipate independent claim 1 because Boleky does not expressly or inherently describe the element recited therein of “a metal feature on an exposed metal structure of the intermediate structure of the semiconductor device.” The arguments presented herein address the new ground of rejection and the arguments raised in the Examiner’s Answer and are provided as a supplement to Appellant’s arguments in the Appeal Brief.

In the Examiner’s Answer, the Examiner states that “exposed layer 18 [of Boleky] is a metal . . . strip” and relies on column 5, lines 45-46 of Boleky in support thereof. The Examiner relies on the disclosure at column 5, lines 45-46 of Boleky of “metal strips 18” as describing “an exposed metal structure,” as recited in claim 1. While Appellant does not dispute that the relied-upon section of Boleky utilizes the phrase “metal strips 18,” Appellant respectfully submits that when Boleky is viewed in its entirety, it is evident that this phrase is a typographical error. As such, the Examiner’s assertion of “metal strips 18” being an alternative for strips 18 made of a semiconductor material is not supported by Boleky. Appellant further submits that when Boleky is viewed in its entirety, it is evident that the phrase “metal strips 32” should have been used in place of “metal strips 18.” Furthermore, the Examiner’s interpretation of a “metal” is contradictory and based on only one known property of metals.

- A. The phrase “metal strips 18” is a typographical error and its use is inconsistent with other portions of Boleky

Appellant respectfully submits that when Boleky is viewed in its entirety, it is evident that use of this phrase “metal strips 18” at column 5, lines 45-46 of Boleky is a typographical error and is inconsistent with other portions of Boleky. Except for the single cited instance of “metal strips 18,” the remainder of Boleky consistently describes strip 18, layer 18, bonding pad element 18', or connector 18 as being formed from a semiconductor material. Specifically, Boleky describes strips 18 as an “elongated strip 18 of a semiconductor material . . . [comprising] N-conductivity type silicon.” Boleky, col. 2, lines 21-24. Boleky also describes strips 18 or bonding pad elements 18' as being formed from silicon (col. 2, line 39), silicon layers (col. 6, lines 5-6), and a semiconductor material (col. 6, lines 28-29). Additionally, Boleky describes the formation of strips 18 and describes that strips 18 are formed from silicon layer 44 (col. 2, lines 64-67).

In addition to predominantly describing strip 18 as being formed from a semiconductor material, Boleky does not include enabling details to support the Examiner's assertion that Boleky intended “metal strips 18” to be an alternative for strips 18 formed from a semiconductor material. For instance, Boleky does not provide examples of metals that could be used as “metal strip 18” and does not describe how such “metal strips 18” would be formed or used. Appellant respectfully submits that if Boleky truly intended “metal strips 18” to be an alternative for strips 18 formed from a semiconductor material, Boleky would have included details of such metal

materials and methods of making and using “metal strips 18.” Instead, in just one isolated instance, Boleky refers to strip 18 as “metal strip 18,” even though strip 18 was explicitly and clearly described numerous other times as a semiconductor material. In light of the lack of disclosure of such metals and the explicit description of every other material in Boleky makes it unlikely that Boleky intended to describe strip 18 as a “metal strip 18.”

Therefore, in light of the detailed description as a whole, Appellant asserts that the use of the phrase “metal strips 18” in Boleky is a typographical error and that strip 18 is made of a semiconductor material.

Appellant also respectfully submits that if the phrase “metal strip 18” in column 5, lines 44-47 is assumed to be correct, this creates numerous inconsistencies and contradictions within Boleky because the remainder of Boleky clearly describes strip 18 as a semiconductor material and that the strip 18 comprises N conductivity type silicon. Boleky, col. 2, lines 22-24. For instance, Boleky describes that circular regions 20 of the strips 18 are doped to P conductivity type to provide PN junctions 22. *Id.* If Boleky intended strip 18 to be a metal, then portions of this metal strip 18 would be doped to form circular regions 20. However, Boleky does not disclose doping a metal strip 18 to form circular regions 20 and PN junctions 22. In addition, a person of ordinary skill in the art would not contemplate doping a metal strip 18 to form circular regions 20 and PN junctions 22. Rather, Boleky clearly describes and illustrates how strips 18 formed from a semiconductor material, circular regions 20, PN junctions 22, and insulation layer 28 are formed. For instance, formation of strips 18 is achieved by growing a layer 44 of N-doped silicon on the surface of substrate 14, as described by Boleky at col. 2, lines 59-61. Layer 44 is

then converted to strip 18 via masking and etching techniques. Boleky, col. 2, lines 64-67. A portion of strip 18 is then converted to P-conductivity type to form portion 20. Id. at col. 3, lines 1-3. Parts of strip 18, made of silicon, are then converted to silicon oxide to form insulation layer 28. Id. at col. 3, lines 6-11.

Furthermore, Boleky does not disclose how “metal strips 18” are formed, how they would function, or what metal may be suitable for strip 18. Assuming *arguendo* that the initially deposited layer 44 was a metal layer (even though Boleky clearly states that it is a silicon layer), none of the above-mentioned steps for producing strips 18 from a layer of N-doped silicon would be applicable to forming “metal strips 18.”

Since it is evident that use of this phrase “metal strips 18” at column 5, lines 45-46 of Boleky is a typographical error and is inconsistent with other portions of Boleky, the Examiner’s reliance on this phrase does not support the Examiner’s assertion that Boleky anticipates claim 1.

- B. The phrase “metal strips 18” is a typographical error and should be “metal strips 32”

Appellant also respectfully submits that the phrase “metal strips 18” at column 5, lines 45-46 of Boleky should, in fact, be “metal strips 32.” This interpretation is reasonable in light of the subject matter described in col 5, lines 35-47 of Boleky and other portions of Boleky, and would be understood as such by a person of ordinary skill in the art. For instance, col 5, lines 44-47 of Boleky describes that “[o]wing to the high doping of the semiconductor elements [or fuses] 42, the contacts of the elements 42 with the metal strips 18 and the metal portions 52 of the

diodes 16 are non-rectifying.” (emphasis added). However, there is no direct contact between fuses 42, strips 18, and metal portions 52, only between fuses 42, metal strips 32, and metal portions 52. As described in Boleky, col. 2, lines 45-47 and illustrated in FIG. 1, fuses 42 are “connected to the strips 32 and connected to the P regions 20 of the diodes 16 through openings through the insulation layer 28.” Boleky, col. 2, lines 45-47. As illustrated in FIGs. 1 and 6 of Boleky, one end of the fuses 42 is connected to metal strip 32 and the other end to portions 52 of metal layer 50, which is in contact with the doped region 20 of strip 18. Therefore, fuses 42 are not connected to both strip 18 and metal portion 52, as is suggested by col 5, lines 44-47 of Boleky if the phrase “metal strips 18” is assumed to be correct. Rather, fuses 42 are in contact with metal strips 32 on one end and metal portions 52 on the other end. In fact, Boleky states that “the fuses 42 [are] extending between and overlapping the various strips 32 and the metal portions 52.” Boleky, col. 3, lines 41-43.

Moreover, Boleky at col. 3, lines 16-19 and 27-29 describes that metal strips 32 and metal portions 52 are made of the same metallic material, such as aluminum, gold, or nickel, which is further evidence that the language used in col. 5, lines 44-47 was intended to describe metal strips 32 and metal portions 52, not “metal strip 18” and metal portions 52. Furthermore, fuses 42 do not form direct contacts with both strip 18 and metal portions 52. Rather, the fuses 42 are connected at one end to metal strip 32 and at the other end to metal strip 52 (being part of metal layer 50), the latter of which is in contact with the doped region 20 of strip 18 (see FIGs. 1 and 6 of Boleky). Assuming that the use of “metal strips 18” at col. 5, lines 44-47 of Boleky is correct, this suggests that fuses 42 are connected at one end to strip 18 and at the other end to metal

portion 52. However, this is incorrect and not supported by the remainder of the text and drawings of Boleky.

Additionally, Boleky states that contacts between the fuses 42, the metal portions 52, and the “metal strips 18” are non-rectifying. A non-rectifying contact is concerned with current flow, resistance, and voltage drops at the metal/semiconductor contact. Since metal portion 52 and “metal strip 18” are on the same end of the fuse 42, it is unlikely that Boleky intended to describe the contact between fuses 42 and other materials at just one end of the fuse 42. Rather, it is more likely that Boleky intended to describe the contacts at each end of the fuse 42 (i.e., contact of the fuses 42 between metal strip 32 and metal portions 52. It is further unlikely that Boleky intended to define the contact on one end of the fuse 42 as non-rectifying and completely ignore the contact on the other end of the fuse 42.

Furthermore, Boleky also specifies that the type of metal from which the metal strip 32 is formed is important in the design of the fuse 42. Boleky col. 3, line 59 – col. 4, line 19. Since metal strip 32 and metal portion 52 are formed from the same material, it, again, shows that Boleky would have described the alleged metal in strip 18 had he intended to disclose that strip 18 may be a metal.

In light of the above, Appellant respectfully asserts that it is clear that Boleky’s use of the phrase “metal strip 18” at column 5, lines 44-47 was inadvertent and an error, and should have been “metal strip 32.” Therefore, considering the entirety of the detailed description, it appears that Boleky mistakenly utilized the phrase “metal strip 18” instead of “metal strip 32.”

- C. The Examiner's interpretation of a "metal" is contradictory and based on one known property of metals

The Examiner asserts that "the term 'metal' is interpreted as a conductor" because "appellants fail to recite any specific metal material for the 'metal' exposed structure." Reply, page 6. In so doing, the Examiner ignores properties of metals other than conductivity, such as ductility, malleability, melting point, heat conductivity, presence of overlapping conduction and valence bands, formation of metallic bonds, and ionization and bonding properties. In addition, the Examiner's definition of "metal" as a conductor is too narrow and classifies many clearly non-metallic substances as metals. Examples of non-metallic compounds that would fall under the Examiner's definition of "metal" include graphite, solutions of salt, and plasmas. However, as described in Appellant's Appeal Brief, metals are clearly classified in the Periodic Table of the Elements, and silicon is not a metal on the Periodic Table of the Elements and is not known in the art as a metal.

In addition, the Examiner has essentially admitted that silicon is not a metal in the Examiner's Answer. The Examiner states that "the term 'metal' is interpreted as a conductor" and that "[i]n the art, 'silicon' material is well known as a semiconductor." Reply at p. 6. Therefore, the Examiner has classified silicon as a semiconductor and a metal as a conductor. As such, the Examiner acknowledges that silicon is a semiconductor, which is not a conductor. Therefore, based on the Examiner's own distinction between conductors and semiconductors, silicon is not a metal because it is a semiconductor.

Since Boleky does not expressly or inherently describe the element recited in claim 1 of

“a metal feature on an exposed metal structure of the intermediate structure of the semiconductor device,” claim 1 is not anticipated by Boleky. Therefore, Appellant respectfully requests that the Board reverse the 35 U.S.C. § 102(b) rejection of claim 1.

Dependent claims 3 through 8 are allowable, *inter alia*, as depending from claim 1.

III. Rejection under 35 U.S.C. § 102(b) over Boleky or, in the alternative, under 35 U.S.C. § 103(a) over Boleky

Dependent claim 2 stands rejected under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a) as assertedly being unpatentable over Boleky.

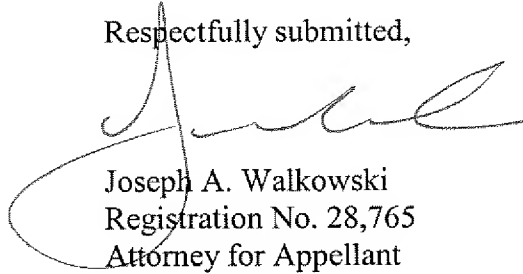
The nonobviousness of independent claim 1 precludes a rejection of claim 2, which depends therefrom, because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), *see also* MPEP § 2143.03.

Therefore, Appellant requests that withdrawal of the 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) rejections of dependent claim 2.

CONCLUSION

For the reasons stated herein and those stated in Appellant's Appeal Brief, , Appellant respectfully submits that claims 1-8 are allowable over the applied references and respectfully requests that the rejection of claims 1-8 under 35 U.S.C. § 102(b) be reversed.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'J. Walkowski', is written over the typed name and title.

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